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STATE DOCUMENTS

REPORT

OF THE

Montana Live Stock Sanitary Board

AND

State Veterinary Surgeon

Including Special Articles on Hog Cholera, Foot-and-Mouth Disease, The Pasteurization of Milk, and The Intra-Dermal Method of Testing Animals for Tuberculosis.

For Years

1913-1914



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Montana Live Stock Sanitary Board.

DAN J. DONOHUE, M. D., Chairman, Glendive, Mont.

HON. T. C. POWER, Vice-Chairman, Helena, Mont.

HON. E. T. BROADWATER, Member, Havre, Mont.

W. J. BUTLER, D. V. S., Secretary, Helena, Mont.

STATE VETERINARY SURGEON

DR. W. J. BUTLER.

CHIEF DEPUTY STATE VETERINARY SURGEON

DR. E. D. NASH.

SPECIAL DEPUTY STATE VETERINARY SURGEONS TO LIVE STOCK SANITARY BOARD

DR. A. J. DUFRENE, Glendive, Montana.

DR. O. J. JOHNSON, Miles City, Montana.

SPECIAL DEPUTY STATE VETERINARY SURGEONS TO BOARD OF SHEEP COMMISSIONERS

DR. F. S. GRAY, Great Falls, Montana.

DR. N. B. SMITH, Billings, Montana.

DEPUTY STATE VETERINARY SURGEONS EMPLOYED ON TUBERCULIN TESTING

Headquarters at Helena, Montana.

DR. J. W. RICHARDSON - - - - - in Charge District No. 1.

DR. JOHN J. MITCHELL - - - - - in Charge District No. 2.

DR. JOHN C. BOYD - - - - - in Charge District No. 3.

DR. MALCOLM McFARLANE - - - - - in Charge District No. 4.

RESIDENT DEPUTY STATE VETERINARY SURGEONS

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DR. H. L. BRAWNER, Livingston.

DR. A. H. CHENEY, - - - Polson.

DR. F. N. FRISCH - - - Glasgow.

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CHEMIST AND BACTERIOLOGIST

DR. EMIL STARZ, Helena, Montana.

EDWARD J. GRINDROD, Chief Clerk.

PAUL RAFTERY, Stenographer.

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Report of Live Stock Sanitary Board.

December 1, 1914.

Honorable S. V. Stewart,
Governor of the State of Montana,
Helena, Montana.

Dear Sir:—

In compliance with Article XI, Civil Code of Montana, we beg to present to you herewith the biennial report of the Live Stock Sanitary Board and the State Veterinary Surgeon.

Owing to the death of the Hon. H. H. Sappington, the personnel of the Board changed in 1914. At a meeting called on September 21, 1914, the Board was reorganized, Dr. Dan J. Donohue being elected chairman, and the Hon. T. C. Power vice-chairman.

During the year 1913 three meetings of the Board were held at the State Capitol; the first on April 26, 1913, the second July 14, 1913, and the third September 23, 1913. At the first meeting general business was transacted. A special meeting was called on July 14th for the purpose of issuing regulations pertaining to the control of dourine. Regulations were accordingly passed and promulgated, and duly recorded in the minute book of the Board. The meeting of September 23d was called for the transaction of general business, the minutes of which were duly recorded.

In 1914 two meetings were held. The first meeting took place September 21, 1914, at the State Capitol. The Board reorganized, transacted general business, and passed regulations pertaining to the control of hog cholera, the sale of serum and virus, and other regulations pertaining to live stock, as duly inscribed in the Live Stock Sanitary Board minute book.

An emergency existed, owing to the prevalence of foot-and-mouth disease, and a special meeting was called by order of the Governor, to be held in the State Capitol at 2 p. m., November 7th. At this meeting the Executive Committees of the Board of Stock Commissioners and the Board of Sheep Commissioners, as well as a number of prominent stockmen, were present. The secretary explained the seriousness of foot-and-

mouth disease, and also informed those present at this joint stock meeting that two shipments had been received in Montana from Chicago suffering from this most dangerous malady. It was the unanimous opinion of all those present that our live-stock interests were being jeopardized by the entry into Montana of foreign stock. The Governor was therefore requested to issue immediately the following proclamation:

Proclamation by the Governor.

"Whereas, the Live Stock Sanitary Board of the State of Montana has knowledge that the disease known as foot and mouth disease is now prevalent among the live stock in different states of the United States; and

"Whereas, the extent of the said infection is unknown:

"Now, therefore, I, S. V. Stewart, as Governor of the State of Montana, and upon the recommendation of the Live Stock Sanitary Board, do hereby declare and proclaim that all shipments of live stock of every description from all states in the United States and the Dominion of Canada are hereby prohibited from entering the State of Montana.

"All stock shipments now actually loaded and en route, which cannot be diverted, must be held at railroad destination until inspected and released by Federal or State Veterinarian.

"And, it is further ordered that no stock shall be moved within the State of Montana unless loaded through stockyards and into stock cars disinfected under the supervision of Federal or State veterinary inspectors.

"This order to take effect immediately.

"IN WITNESS WHEREOF, I have hereunto set my hand and caused the Great Seal of the State to be affixed. Done at Helena, the Capital, this the seventh day of November, in the year of our Lord one thousand nine hundred fourteen.

"S. V. STEWART,

"Governor.

"A. M. ALDERSON,

"Secretary of State."

The State Veterinarian's report which follows gives a summary of the work that has been accomplished to date, and we feel confident that this disease is now under control and has been eradicated from the State of Montana.

As has been previously reported, in September, 1912, dourine was found to exist in horses in Eastern Montana. This was a very serious condition, and the United States Department of Agriculture seriously considered placing a quarantine on all breeding animals of the equine species in the State of Montana. A meeting of the Eastern Montana Horsemen's Protective Association was held at Miles City in April, 1913, at which were present representatives from the Bureau of Animal Industry, Washington, D. C., the state veterinarians of Minnesota, North Dakota, Wyoming, Oregon, and representatives of the Montana Live Stock Sanitary Board. We are glad to state to you that, owing to the sanitary laws we have in Montana, and to the active co-operation of the horsemen of the State, we were able to avert a Federal quarantine.

No extra appropriation was made by the Legislature in 1913 for this work, so we were dependent to a great extent upon aid from the United States Bureau of Animal Industry. In the fall of 1913, the disease having been found to also exist in North Dakota and Wyoming, the Federal funds available for this work were exhausted. We were notified that unless the work could be continued it would be necessary to place a Federal quarantine on our horses. A representative of the Live Stock Sanitary Board proceeded to Washington, D. C., and through the capable efforts of our representatives in the United States Senate and House of Representatives, Congress appropriated \$100,000 for the eradication of dourine. The avoidance of a Federal quarantine saved our horsemen from a tremendous loss, leaving open to them the markets of the world, which is especially appreciated at this time owing to the demand for cavalry and artillery horses, for which purposes Montana horses are surpassed by none in the world. By agreement this money was also used in indemnifying owners of diseased animals, the Government paying one-half of the assessed valuation, and thus requiring the payment of only one-fourth by the State and one-fourth by the county, and which also resulted in a saving of many thousands of dollars.

We desire to express at this time our appreciation of the co-operation rendered by the Federal veterinarians, and also

by the representatives of the different sheriffs' offices and stock inspectors in assisting us in the necessary inspection of horses, both in the stock yards and on the range.

We desire to respectfully call the attention of the Legislature to the necessity of providing sufficient funds for the protection of the live-stock industry. It is impossible to estimate the amount of work which the Live Stock Sanitary Corps may be called upon to perform in any given emergency, or to forecast the outbreak of a contagious disease. This is strikingly illustrated by the recent outbreak of foot-and-mouth disease. Your Sanitary Board and State Veterinary Surgeon have been placed at a tremendous disadvantage in combating and controlling this live-stock scourge. As stated in the State Veterinary Surgeon's report, the law allows the Sanitary Board to hire only three veterinarians, and provides it with hardly sufficient funds to employ two regular salaried veterinarians. Again, there is no provision for indemnifying or compensating owners of animals ordered destroyed for other than dourine, glanders, and tuberculosis. This handicaps the efficiency of our work. In diseased conditions where the animals may eventually recover, although for economic reasons and the safety of the live-stock industry it is advisable to destroy them, the owners always feel they should be compensated by the State as well as by the United States Government for their loss. The necessity of a sufficient fund being placed to our credit is again illustrated by the fact that if our representatives in Congress had not been able to secure an appropriation for the eradication of dourine, an enormous loss would have resulted to our horse industry.

We recommend an accumulative and reserve fund, to be created and maintained by means of a special tax, as in the case of the Bounty Fund, or the Stock Inspection and the Sheep Inspection and Indemnity Fund. This fund should be amply sufficient to cover all work of the Live Stock Sanitary Board, including the tuberculin test of cattle and the payment of all indemnities; all payments out of this fund to be passed upon by the Board of Examiners, audited by the State Auditor, and paid out by the State Treasurer.

We also recommend the appropriation by the Legislature of sufficient funds to pay all outstanding claims against the State for animals destroyed by order of the Live Stock Sanitary Board.

We also desire to call the attention of the Legislature to the necessity of amending our laws so that this Board may appoint additional veterinarians as increased work may demand. The State is developing so rapidly and the demands upon our Sanitary Corps increasing to such an extent as to render the number of veterinarians allowed inadequate for proper sanitary protection.

Regarding the tuberculin test, we desire to express absolutely the uselessness and impracticability of the law requiring six ante and six post temperatures. The United States Bureau of Animal Industry requires but three ante and five post temperatures. New methods are constantly being adopted, and we consider that for practical work, and in order that Montana may be kept in the foremost ranks, the manner and method of testing any and all animals should be left to the decision of the Live Stock Sanitary Board. This Board, co-operating with the Agricultural College, has for the past year and a half been testing the efficiency and reliability of the intra-dermal tuberculin test. It has so far proven successful, and we believe that by using this test the tuberculin testing corps could, without any additional expenditure of money, increase the number of cattle tested yearly by over four hundred per cent.

The milk question is without doubt one of the greatest sanitary problems in the world to-day. Milk is the sole food of our young, and it is the most nutritious, best balanced food partaken of by man. It is also one of the best and most common carriers of disease. We recommend the establishment of city, county, or State centralized plants where all milk shall be pasteurized, unless from a dairy and accredited herd classified A1. The cost of pasteurization would be minimized by the lessened number of wagons needed to deliver milk within the city.

We do not recommend the establishment of a State anti-hog cholera serum laboratory, but we do respectfully recommend an adequate appropriation for the use of the Agricultural College in the purchase of anti-hog cholera serum. At the present time we think \$1,500 or \$2,000 sufficient. Out of this sum the Agricultural College could purchase serum, properly test it for potency, and forward it at purchase price plus postage or express to farmers or hog growers when occasion

demands. All moneys received from the sale of serum should be used for purchasing fresh supplies.

We beg to call your attention to the completeness of the State Veterinary Surgeon's report and to his special articles on Hog Cholera, Foot-and-Mouth Disease, and The Pasteurization of Milk.

Respectfully submitted,

DAN J. DONOHUE, M. D., Chairman.

T. C. POWER, Vice-Chairman,

E. T. BROADWATER, Member.

W. J. BUTLER, D. V. S., Secretary.

Report of State Veterinary Surgeon.

Helena, Montana, December 1, 1914.

To the Honorable Live Stock Sanitary Board,

Helena, Montana.

Gentlemen:—

I herewith present the biennial report of this office for the years 1913 and 1914, ending November 30, 1914.

During 1913 the State Veterinary Surgeon's office, in conjunction with the Bureau of Animal Industry, examined 16,650 mares and stallions for dourine; 9,522 blood samples were obtained and forwarded to the Pathological Division of the Bureau of Animal Industry, Washington, D. C., for the complement-fixation test for dourine. Out of this number 965 reacted to the test, or 10.1 per cent. In 1914 we inspected 43,015 animals for dourine; of this number we blood tested 41,796. Out of the 41,796 animals blood tested, 1,104 reacted, or 2.6 per cent. We have disposed of or castrated 943 animals. The castrated reactors are being used for work purposes under a written agreement that they will not be turned loose or exposed to any female breeding animal of the same species.

I desire to call your attention to the material decrease in the percentage of reactors. This is due to the excellent work done by the Federal and Live Stock Sanitary corps in 1913. It is indeed encouraging, and shows beyond a question that with the active co-operation of the horsemen and the continuation of proper veterinary inspection the disease will be eradicated within a very short time. I am glad to report to you that we have tested every exposed herd, and, with very few exceptions, every exposed animal in Eastern Montana. In 1915 it will not be necessary to test many of the herds tested in 1914; in fact, the Federal Government will permit us to release all herds that were tested this year provided they were tested previous to breeding, or in which, after breeding, no reactors male or female were found, and provided further that they have not been re-exposed. In 1914 we found two cases of dourine in Teton County. This infection was found to have originated in stray horses trailing in from Canada. It is practically impossible to prevent this source of infection, as

range horses range back and forth across the boundary line. We immediately tested all exposed animals in co-operation with the horsemen of that section, and we now have reason to believe that dourine has been eradicated from that section. The disease was also found to be prevalent on the Ft. Belknap Reservation. The Federal veterinarians tested a number of animals in that section, but on account of lack of funds the work was discontinued, and a retest of many herds will be necessary before dourine is finally eradicated in Blaine County. The disease was also found to exist in Valley, Sheridan, and Rosebud Counties besides the main center of infection in Dawson and Custer Counties.

I desire to call your attention to the magnitude of the work accomplished. Covering a territory larger than the combined area of several of our Eastern States, and nearly twice the size of Great Britain, acting with Federal veterinarians, we have blood tested 41,796 horses. Eighty per cent of these animals were unbroken range horses. To obtain the proper sample it was necessary to draw six ounces of blood from the jugular vein in an aseptic manner. Every bottle was sterilized and the trocar and canula washed in an antiseptic solution before each blood sample was obtained. Again, every bottle was marked not only with the number and description of the horse, but also with the name of the owner; and to further guard against mistakes each blood sample had a separate number bearing a co-efficient designating the inspector who obtained the sample. The blood was allowed to clot, the serum drawn off, and forwarded to the Pathological Division of the United States Bureau of Animal Industry at Washington, D. C., bearing complete data. To insure identification every animal tested, unless in the case of gentle broken horses, was branded with a serial number by means of a hot iron. The Federal and deputy state veterinarians working on dourine deserve great praise for their efficiency and painstaking work. Since this method of identification has been adopted, due to their carefulness and attention, not one case of mistaken identity has taken place. All this under the most adverse conditions, unbroken range animals, necessity of asepsis, and a number of details necessary when you realize the blood is obtained from the jugular vein of an animal that never saw a halter; so I desire to once more thank the Federal and deputy state veter-

inarians for the efficient work rendered the horsemen of Montana and the State Veterinary Surgeon's office.

The efficiency of the method adopted for the eradication of dourine is manifested by the absence of a Federal quarantine. Our horsemen are selling their produce to the world's market, and with one exception—a mistake which was rectified immediately and the animal overtaken en route—not a single animal has been shipped from the infected area that has not been properly tested and passed, and at the present time most of our reactors have been disposed of, and every known diseased or exposed animal is under quarantine.

I desire to express to you my regret in having to destroy many of these dourine reactors. Some of them, as far as the eye can discern or physical inspection determine, are capable in every way of doing a normal day's work. It is indeed regrettable that we cannot break and use these animals for work; but owing to our range conditions and our inability to control and guard such reactors, we are compelled for economic reasons to destroy them. If they are not properly disposed of, the Federal Government and all of the States in the Union would immediately place a quarantine on Montana horses and our markets would be shut off, so that we have no recourse other than to destroy them for the protection of our horse industry as a whole. I may state to you that the Bureau of Animal Industry is working on a cure for this disease, and should it be successful in its efforts it will be of great benefit to the horse industry not only in this State, but in any other States where animals are infected with dourine. But, as I have previously stated, if we are able to continue our work, Montana should ere long be free from this disease.

I cannot close this report on dourine without respectfully calling the attention of the Legislature to the unjustness to the live-stock industry, the Sanitary Board, and the State Veterinary Surgeon's office in only appropriating \$10,000 for the prevention and eradication of animal diseases in a country three times the size of the State of New York, and having the following stock census and value as compiled by the Bureau of Statistics, U. S. Department of Agriculture:

STOCK CENSUS IN MONTANA.

	Total Num- ber	Value Per Head	Total Value
CATTLE. Other than milch cows. Estimated No. and value Jan. 1, 1914.....	753,000	\$46.40	\$34,939,000
MILCH COWS. Estimated No. and value Jan. 1, 1914	104,000	70.50	7,332,000
SHEEP. Estimated No. and value Jan. 1, 1914	4,293,000	3.70	15,884,000
SWINE. Estimated No. and value Jan. 1, 1914	184,000	11.90	2,190,000
HORSES. Estimated No. and value Jan. 1, 1914	372,000	102.00	37,944,000
MULES. Estimated No. and value Jan. 1, 1914	4,000	106.00	424,000
Total live stock	5,710,000		
Total value			\$98,713,000

Glanders.

Glanders exists in Montana to a very slight extent. Among our range animals it is practically unknown. In 1914 we mallein tested and inspected 8,307 horses for interstate shipment without finding one diseased animal. Most of our cases are found in districts where railroad or irrigating ditch work has been in progress. With very little expenditure glanders should be kept under control if not completely eradicated. A tabulation of the work on glanders will be found on pages 62 and 63 of the summary appended to this report.

Foot-and-Mouth Disease.

On the morning of November 5, 1914, I received a telegram from Dr. A. J. Du Frene, special deputy state veterinary surgeon located at Glendive, to the effect that he had received information that 27 cars of cattle destined to Montana had shown signs of foot-and-mouth disease when unloaded for feed at the Sunnyside feed yards, near Mandan, N. Dak. Unfortunately, by the time the word was received these cattle had already entered Montana, so he was immediately instructed to order them unloaded at the first railroad yards in Montana where feed and water could be secured. The train was stopped at Miles City and returned to Glendive, as the Glendive yards are the only ones where proper shelter, feed and water could

be secured. Dr. O. J. Johnson, of Miles City, and Dr. N. B. Smith, of Billings, were instructed to proceed immediately to Glendive and assist Dr. Du Frene in making a diagnosis. Upon inspection three carloads, consisting of 105 head of cattle originating at Chicago, Ill., were found infected with foot-and-mouth disease. The balance of the shipment had been exposed to these cattle at the Sunnyside feed yards, so the entire trainload was quarantined in the yards at Glendive. Every precaution was taken, the exposed cattle unloaded first and placed in separate pens, and the diseased cattle unloaded last and placed in an isolated pen with vacant pens between them and the balance of the shipment. Deputy sheriffs were placed on guard, and no one other than the men necessary to feed the animals was allowed within 100 yards of the stock yards. Rubber suits, gloves and boots were supplied the helpers, and one man was designated to attend the diseased cattle. He did not go near any other pen, and the men employed to feed the exposed animals were not permitted to go near the pen containing the diseased cattle. A small shed was built, and the clothing of the men working in the yards was thoroughly disinfected and fumigated both prior to and after they had finished feeding and watering the animals in the yards.

Dr. R. H. Treacy, Federal inspector in charge of the Northwestern territory, with headquarters at Bismark, N. Dak., was immediately notified, and he at once proceeded to Glendive and confirmed the diagnosis. As soon as the necessary arrangements could be made the diseased animals were destroyed and buried in lime. On Friday, November 13th, a thorough inspection was made of the remaining animals, and the disease was found to exist in many of them. On instruction from the Bureau of Animal Industry, Department of Agriculture, all these cattle were ordered destroyed and buried in lime. This order was issued by this office in conjunction with the representatives of the Bureau of Animal Industry, and all infected and exposed animals were disposed of on November 21st. The railroad company placed men at our disposal and handled the matter in a most efficient manner, and co-operated with us in such a way as to deserve the appreciation and thanks of the Live Stock Sanitary Board and the live-stock interests of Montana.

On November 8th, in tracing up recent shipments into Montana, we found that 139 head of cattle originating at

Chicago, Ill., had been unloaded at Terry and trailed north to the owner's ranch. A veterinarian was immediately dispatched there to make an examination. He examined the cattle on November 9th, and while the animals at that time showed no symptoms of the disease, they were placed in close quarantine and the owner instructed regarding the probability of their being diseased and the necessity of isolating them. On November 13th a re-inspection was made in conjunction with the Federal authorities, and several animals were found to be afflicted with foot-and-mouth disease. Unfortunately the owner, previous to our arrival at his ranch, had exposed 21 native cattle, 152 bucks, 18 lambs and 11 hogs. Inspection of the exposed animals was made daily, and on November 20th the hogs showed positive symptoms of the disease, a number of sheep suspicious symptoms, and many of the cattle positive symptoms, so that on instructions from the Federal authorities these animals were ordered destroyed. This has been done; and the yards, corrals, and infected premises thoroughly cleaned and disinfected.

When this shipment from Chicago had been unloaded at Terry, the owner found it necessary to move them from the Milwaukee railroad yards to the Northern Pacific stock yards in order that they might obtain water. This apparently infected the space between the two yards, and on November 14th it was found that three milk cows owned in Terry had become infected with the disease, no doubt through grazing and feeding in the vicinity of the stock yards. The town of Terry was immediately placed under quarantine, all remaining cattle inspected, and an order issued that all public barns should be thoroughly cleaned and disinfected, all alleys cleaned, and all manure piles removed and burned. Daily inspections were made of all milk cows in Terry, and in all seven more cattle were found diseased or actually exposed to a diseased animal. The last case was found on November 23d, and since that date no more cases of foot-and-mouth disease have been reported.

In order that the necessary precautions might be taken, all live stock entering Montana since October 25th was ordered quarantined for a period of not less than 21 days, and inspected. Although we have had many reports that this disease had made its appearance in other parts of the State, I am pleased

to state that so far upon proper inspection no cases have been found other than in the above-mentioned instances, and I have every reason to believe and sincerely trust that foot-and-mouth disease no longer exists within the State of Montana.

To further safeguard our live stock, all stock yards within the State that have contained foreign shipments of live stock since October 25, 1914, and all stock cars have been or will be thoroughly disinfected under the supervision of the Federal or State authorities.

At this time I desire to publicly and officially express my thanks and appreciation to Dr. R. H. Treacy, Federal inspector in charge, and to the different railroads and railroad officials in the State of Montana, for their more than active co-operation with the Live Stock Sanitary Board in eradicating and preventing the spread of foot-and-mouth disease in this State.

Tuberculosis in Cattle.

The work on tuberculin testing of cattle is progressing very favorably. This work is very important to the community at large, and its success depends not only upon the education and co-operation of the dairymen, but also upon the education and co-operation of the milk-drinking community. We find the dairymen in general throughout the State desirous of having clean, healthy cattle; and now that they receive compensation for condemned animals, the work progresses in a more harmonious manner than in previous years.

In 1913 we tested 6,769 cattle, out of which 371 reacted to the test, or 5.4 per cent. It is the policy of this office to test all cattle, irrespective of the size of the dairy or number of cattle. In 1913 our work had been confined principally to the dairies in the larger cities; but in 1914, in order that the work might be carried out systematically, we were compelled to test the smaller dairy herds in the country regions. This naturally resulted in fewer cattle being tested, but at a greater expenditure of energy. In 1914 we tested 5,788 cattle, out of which 174 reacted, or 3 per cent. I desire to call your attention to the material reduction in the tuberculin reactors from year to year since the tuberculin testing of cattle has been compulsory. There are very few states or counties in the world that can show such a low percentage of reactors.

Contagious Abortion.

Contagious abortion has made its appearance in different sections of the State, and while this disease has been known to exist in Montana for some time, in one or two of the recent cases investigated we found the infection had been brought in to us by dairy shipments from Eastern States. While this disease has never existed very extensively in Montana, it is one that all sanitarians must look upon with considerable alarm, both from an economic standpoint and the danger arising from the causative agent, the *bacillus abortus* of Bang being found in the milk of infected cows. To those interested in this disease, I desire to recommend Circular 216, issued by the Bureau of Animal Industry, United States Department of Agriculture; and also Bulletin No. 90, issued by the Montana Agricultural College.

Hog Cholera.

Hog cholera persists in making its appearance in different parts of the State. As you know, our regulations require all hogs coming into Montana to be accompanied by a health certificate stating that the animals are free from disease and originated in a locality where no hog cholera has actually existed for the past six months, or that they have been immunized with Dorset-McBride-Niles anti-hog cholera serum. In many of our outbreaks the infection has been traced to the feeding of slops and refuse from restaurants. This is a custom that should either be stopped, or the hog grower compelled to boil all refuse before feeding. I am thoroughly convinced that infection is also brought in on farmers' implements and in the litter of immigrants; also by railroad stock cars and litter dropping from hog shipments en route to market. It may also be carried by migratory birds; so that as long as we are unable to control the movements of such methods of infection, we must expect outbreaks of hog cholera from time to time.

In instances where the disease has been promptly reported to this office, I am pleased to state to you that we have been able, with proper sanitation and anti-hog cholera serum treatment, to reduce the mortality of hog cholera by sixty to seventy per cent.

Scabies in Cattle.

In 1914 we dipped 3,380 cattle for scabies. As a result of our work the Bureau of Animal Industry has removed the Federal quarantine on account of cattle scabies from the State of Montana.

Scabies in Sheep.

No scabies in sheep exists in the State of Montana.

Lip and Leg Ulceration.

During 1913 several bands of sheep were affected with the venereal form of necrobacillosis, or lip and leg ulceration. By sanitary measures and the liberal use of tincture of iodine on the affected parts we were able in most cases to cure the animal and control the disease in the affected herds.

Blackleg Vaccine.

In 1913 we distributed 40,725 doses of blackleg vaccine. In 1914 we distributed 62,240 doses of the vaccine. This is an enormous increase from past years, and not only proves the value of the vaccine, but tends to show the increase in stock-raising and the improvement not only in the class and breed of our cattle, but also the better care being taken of our live stock.

Importations of Live Stock.

The importation of live stock into Montana during the year 1913 showed a phenomenal increase over all previous years. In 1914 the increase continued. This increase is best illustrated by the tabulated list appended, showing the importations from the different states and the Dominion of Canada.

Respectfully submitted,

W. J. BUTLER,
State Veterinary Surgeon.

Hog Cholera.

Hog cholera is without doubt the most infectious contagious disease that attacks the hog family. It is caused by a microorganism, "germ," so small, or of such a structure, that it passes through the finest filter known to science, and cannot be seen with the strongest microscopes now available. The microorganism is present in the blood and excrements of the diseased hog, particularly in the feces and urine. That hog cholera is caused by a microorganism, and that the specific germ is present in the blood and excrements of the sick hog, is proven by the fact that the disease can be produced without fail by inoculating well hogs that have not been immunized with the blood or excrements from a diseased animal.

History of the Disease.

Hog cholera is found in practically all parts of the world. The first recorded outbreak in the United States occurred in Ohio, in 1833. It is supposed to have been introduced into this country through the importation of hogs from European countries. The infection has gradually spread along the lines of transportation to all parts of the United States, so that to-day no section of the country may be regarded as free from hog cholera. The direct loss from this disease alone to the hog raisers in the United States is estimated to be over \$60,000,000.00 per year.

Susceptibility of Breeds.

No breed of hogs is immune. All are equally susceptible, the "mule-foot" and "razor-back" hog not excepted.

Pigs and young shoats are more susceptible than older hogs.

Hogs that recover from hog cholera are immune. Immune sows transmit a certain amount of immunity to their young previous to weaning, and hogs raised in communities where cholera is prevalent year in and year out show a greater resistance to the ravages of the disease than hogs raised in a newly infected country.

In newly infected areas the death rate will average from 60 to 90 per cent, while in old infected centers the death rate may be as low as 30 to 40 per cent.

Predisposing Causes.

While the minute microorganism or germ previously referred to is the cause, and the only cause of hog cholera, it must be borne in mind that there are many factors which may render a herd more susceptible to the disease. Any cause or condition which lowers the vitality or health of an animal is a predisposing cause. The most common predisposing causes are:

1. Improper feeding, which includes overfeeding, insufficient feed, unbalanced rations, garbage, fermented or irritating slops.
2. Insanitary sheds, feed lots, pens, or corrals.
3. Cold, damp, draughty sleeping places.
4. Crowding of hogs in sleeping quarters.
5. Impure drinking water. Hogs require good drinking water just the same as any other animal, and should not be permitted to drink drainage or dirty water in which they bathe. Supply them with fresh, pure drinking water.
6. Lice and worms also tend to lower the vitality of hogs.

Since many hogs are worm infested, the following formula is suggested by the Kentucky Experiment Station:

Santonin	2½ grains
Areca Nut.....	1 dram
Calomel	1 grain
Sodium Carbonate	1 dram

This is a sufficient quantity for each 100 pounds of live weight. The animals should be starved for 12 to 24 hours, then given the proper dose of medicine in slop or moist food in the evening. The following morning each hog should receive a tablespoonful of Epsom salts.

Method of Transmission.

Insanitary conditions may lower the vitality of hogs and lessen their resistance to disease, but, as previously stated, cholera can be started in a herd only by the introduction of the germ which causes it. This transmission may take place by direct contact of one hog with another (purchase of new stock, hogs escaping from a neighboring herd, returning hogs from a fair or stock show, purchase of hogs which have apparently recovered from cholera); birds, dogs, running streams or irrigating ditches may carry the infection from

one place to another. Likewise the germ may be carried on the shoes or clothing of individuals or on utensils used around hog pens, or the infection may take place by eating infected food such as diseased carcasses or uncooked swill that contains scraps of pork from hogs that died from cholera.

All stock yards must be classified as infected premises, so that the use of any common or railroad stock yard or stock car must be looked upon as a source of danger. Dr. M. Dorset, of the United States Bureau of Animal Industry, gives the following estimated percentage of the modes of transmission as found in the corn belt states:

Visitation of neighbors carrying the micro-organism on their shoes from infected herds to uninfected herds are responsible for	33	per cent of the outbreaks.
Birds carry the infection in.....	33	per cent of the outbreaks.
Dogs are responsible for.....	6.5	per cent of the outbreaks.
Streams and irrigation ditches in.....	8	per cent of the outbreaks.
Hogs on adjoining premises in.....	4.5	per cent of the outbreaks.
Escaped hogs in.....	4	per cent of the outbreaks.
New stock from infected sources in.....	10	per cent of the outbreaks.
Other sources	6.5	per cent of the outbreaks.

Symptoms.

Medical authorities speak of hog cholera as manifesting three forms—the acute, sub-acute, and chronic, but from the practical standpoint we may classify the disease into two forms, the acute and chronic. No matter which form the disease may take, inflammation and necrosis of the tissue or organ affected takes place.

In Montana the acute form predominates, and we find the lungs the principal seat of infection. We find pneumonia or pleuro-pneumonia in 90 per cent of our cases. In fact many of our outbreaks are reported to us as contagious pleuro-pneumonia, but on proper investigation all our so-called contagious pleuro-pneumonia cases have turned out to be hog cholera.

In the acute form the period of incubation, or time elapsing between the time the animal contracts the disease and the time the first symptom appears, is from two to eight days, although no animal can actually be said to be free from the disease until thirty days have elapsed. As has been said, young hogs are more susceptible, and naturally they generally show the first symptoms. One, or several, of the younger animals will be

noticed to lag behind the others. They refuse their food, may appear to suffer from cold, shiver, will seek their sleeping quarters, be restless and anxious, ears hot and lop down. Back may be arched. They may stand cross legged, and when they walk may do so with an uncertain, wabbling gait; in fact they will appear to be paralyzed in the hind quarters, and when handled may emit a peculiar squeal. Diarrhoea or constipation may be present, but in most cases diarrhoea with blood stained feces will follow constipation as food becomes decomposed in the intestines. Breathing or respiration is hurried and the animal may show signs of pain. Skin lesions present themselves in the form of small dark red or purple spots on the abdomen, inner side of the thighs or under the arms. Inflammatory areas may develop, causing sores on the back or the sides, the head or the neck, or most any part of the body. These sores may develop into large sloughs. In many cases a muco-purulent discharge from the eyes which causes the eyelids to stick together. The animals have a high fever anywhere from 105° to 108° F. The normal temperature of a hog is 102° to 103° F. If the disease persist these symptoms are followed by complete depression, stupor, coma, and death.

Chronic Symptoms.

Acute hog cholera is so rapid in its manifestation of symptoms that it should be diagnosed immediately by the hog grower, but the chronic form may be of such an insidious character that it will baffle even the careful observer. In fact, hog cholera may not be suspected until one or two animals develop the acute symptoms.

In the chronic form a few animals may show signs of slight illness, not sufficient to cause alarm, or of enough apparent importance to demand the attention of a veterinarian. The trouble may be laid to indigestion, rheumatism, worms, or a cold. The animals may be off their feed for a day or so, then apparently pick up again. As the disease progresses the animals grow weaker. The temperature at the onset may be as high as in acute hog cholera, but will drop down. It may go to normal, or it may even fall two or three degrees below normal. In chronic cases the digestive symptoms will predominate. Alternating diarrhoea and constipation. Bloody stools. Ulceration of the intestines. The back may be arched, a symptom of intestinal lesions or acute nephritis (inflama-

tion of the kidneys). The animals have a characteristic cough in chronic cases. The inflammatory skin lesions are present. These inflamed areas or blotches may become hard and dry, resulting in large sloughs. In fact, sloughing of the tail or the ears or hair, is not uncommon. The appetite fails and the animal grows weaker and weaker.

This form of hog cholera is extremely dangerous, as the disease may not be recognized until the entire herd is infected.

Post Mortem.

In cases of doubt, if there is not at hand the carcass of an animal that has recently died, the sickest appearing animal of the herd should be destroyed and a thorough examination made of the carcass and various organs to determine the nature of the disease.

The skin should be examined for red or purplish blotches, especially in the region of the abdomen, the inside of the legs and around the ears and neck.

After an examination of the skin has been made the hog is laid on its back and, beginning at the neck, an incision is made along the middle of the chest and belly the entire length of the body. Cross incision should be made and the ribs severed so they may be laid back and the various organs exposed for examination.

Lungs.

Healthy lungs are soft, pink in color, and filled with air. In hog cholera, and especially in Montana, in 90 per cent or better we find pneumonia, congested necrotic areas, gangrene and pus. There may also be pleural adhesions. In less severe cases we get small hemorrhagic infarcts and petechia. These are small red spots caused by the rupture of minute blood vessels, which allows the blood to escape into the tissue. They cannot be washed off and are one of the principal lesions found in hog cholera.

Heart.

The heart does not very often show lesions, but in an acute, virulent attacks of hog cholera, small petechia, or red spots, as described above, may be found. The pericardium, or thin membranous sac which envelopes the heart, should be split and removed to permit a better view of the heart proper.

Liver.

The liver seldom shows a marked change other than congestion and probably an increase in its fibrous substance.

Spleen or Milt.

The spleen in most cases is enlarged, soft, dark, and engorged with blood in acute cases. In chronic cases as the inflammation subsides and the connective tissue increases it becomes smaller and grayish in color.

Kidneys.

The thin membranous sac enveloping the kidneys should be removed. The kidney will be dark in color and many small red spots, slightly smaller than those found in the heart and lungs, will be found. They will vary in size from a pin point to a pin head and resemble very much the spots on a turkey egg.

Stomach.

Very often large inflamed and red areas of the inside lining, with ulcerations. The ulceration may be more or less extensive and is generally separated from the healthy tissue by a distinctive line.

Small Intestines.

Seldom any marked change in the small intestines other than hemorrhagic, or blood spots. These spots may not be present unless the case is an acute type.

Large Intestines.

It is in the large intestines we find specific post mortem lesions. Hemorrhagic spots on the inside. The inner lining is blood stained and often the feces are bloody, due to an effusion of blood from the inflamed areas. In chronic cases we find the characteristic lesion "Button" ulcers. These are a positive indication of hog cholera. They are round, hard, and yellowish, with a dark center. They are distinctly raised above the healthy tissue and vary in size from a small point to a little better than a twenty-five cent piece.

Lymphatic Glands.

The lymphatic glands, especially the inguinal lymphatics, become enlarged, congested, and show the characteristic hemorrhagic spots. They become red in color, in fact sometimes almost black.

Dr. M. Dorset, who is freely quoted in this article, summarizes the post mortem appearances as follows:

1. Reddening of the skin.
2. Bloody spots in the lungs, on the surface of the heart, in the kidneys, on the outer surface and inner lining of the intestines and the stomach.
3. Reddening of the lymphatic glands.
4. Enlargement of the spleen.
5. Ulceration of the inner lining of the large intestines.

To these must be added the gangrenous pneumonic lung lesions found extensively in Montana. It is seldom we find all of these lesions in any one case. In the acute cases pneumonia, blood spots, enlarged spleen and reddened lymphatics predominate. In chronic cases the button ulcers.

Diseases Which May Be Mistaken For Hog Cholera.

Anthrax, Lung Worms, Swine Plague and Digestive Troubles.

Treatment.

Some authorities have stated there is only one effective method of combating hog cholera—the Dorset-Niles method of immunization. This statement accepted by the farmers in its literal meaning has undoubtedly cost the hog growers many millions of dollars.

In all infectious contagious diseases SANITATION comes first.

The Dorset-Niles method of immunization, or hypodermic injection of anti-hog cholera serum combined with sanitation, is a specific for hog cholera. Immunization without sanitation will not eradicate hog cholera. Immunization without sanitation is a lazy man's way of doing business. It is unfair to anti-hog cholera serum. Would you not call a man foolhardy who immediately after being vaccinated for typhoid fever partook of broth cultures of the typhoid bacillus with his daily meals? Why then subject your hogs to similar conditions? That is what is done when you immunize your animals without following up with sanitary methods. Anti-hog cholera serum will offset a certain amount of infection as demonstrated by the prolonged immunity which follows the simultaneous method of immunization, but it is extremely doubtful if any vaccine or serum known to-day will offset continuous virulent infection. You must thoroughly clean and disinfect your

barns, your sheds, your pens, your corrals. You must clean your yards and sprinkle lime on the entire infected ground. You must give your hogs a fit place to live in and fit food to eat. A hog is a creature of environment. It is what you make it, either one of the cleanest animals on earth or one of the dirtiest.

To what class do your hogs belong?

Prophylactic Treatment.

Prophylactic treatment, or the prevention of disease, is the desire and aim of all sanitarians. As long as there are railroad trains, birds, streams, and settlers coming into the country it is impossible to prevent hog cholera infection, but the hog grower co-operating with the sanitarian can prevent many outbreaks of the disease. If your neighbor has hog cholera in his herd, keep away from his premises. Do not permit him to visit your pens. If there is hog cholera in the neighborhood, do not permit anyone to visit your hog pens. Isolate your animals and see that dogs and as many birds as possible are kept off the premises. If you buy new hogs do not immediately turn them in with your other hogs. Isolate and quarantine them for at least thirty days. If no symptoms of disease appear at the end of that period they may then be turned in with the others. Keep your hogs away from railroad and other public stock yards as much as possible, and do not permit them to travel at will on the public highway. Do not feed them meat scraps or swill unless it is thoroughly cooked. Above all keep your pens and yards thoroughly cleaned, just the same as you would a dairy barn. Remember, microorganisms and disease delight and thrive in accumulations of filth, and in dirty, unventilated places.

When your hogs get sick the first thing to do is to call a veterinarian. If you suspect hog cholera or an infectious contagious disease, immediately notify the State Veterinary Surgeon at Helena.

When an infectious, contagious disease is suspected, remove the healthy animals from the sick ones to an uninfected pen or pasture. If you remove the diseased animals and permit the healthy hogs to remain in the infected pens, the diseased hogs carry the infection to the pens to which they are moved and the healthy hogs will be subjected to infection in the already infected pens.

Serum Treatment.

Anti-hog cholera serum is the defibrinated blood (blood with solids or clot removed) of a healthy hog that has been hyper-immunized against hog cholera. It contains no microorganisms, and it is impossible for this serum to cause hog cholera. It contains "antibodies," a chemical substance which possesses the power to destroy the microorganisms of hog cholera, and thus by injection, protects or immunizes healthy hogs against the disease. There is no restriction against the use of serum.

Hog cholera virus is the defibrinated blood of a hog suffering from hog cholera. It contains the specific microorganism that causes hog cholera. If injected into a hog that animal will suffer from hog cholera. If spilt upon the ground it infects that particular section or pen, and hogs using that pen will be exposed to hog cholera. The use of virus is restricted. Only graduate veterinarians and owners having a written permit from the State Veterinarian's office are allowed to use virus, and then under restrictions, and only in the simultaneous treatment of immunizing hogs. See Order No. 9, page 58.

Method of Vaccinating.

There are three methods of immunizing against hog cholera: Serum alone, simultaneous method (sometimes called double vaccination), and the combination method.

The serum alone method consists in the hypodermic injection of anti-hog cholera serum without the use of virus. It renders a passive or temporary immunity lasting from thirty to ninety days. The serum alone method is recommended by the Live Stock Sanitary Board for immunizing hogs in the State of Montana.

The advantages of serum alone treatment are:

1. Protection begins immediately.
2. Curative as well as protective effect in cases where disease has not fully developed.
3. Will not cause shock to the system and will not cause death of young in pregnant sows.
4. Can in no way bring hog cholera infection into the herd or farm.

Its disadvantage is its short period of immunity or protection.

The simultaneous method consists in the hypodermic injection of a small amount of hog cholera virus, and at the same time the injection of anti-hog cholera serum in another part of the body. This method subjects the patient to a slight attack of hog cholera, which is controlled and cured by the anti-hog cholera serum. It gives the animal an active or lasting immunity varying from one to two years and in many cases lifelong.

The simultaneous method must never be used in animals with a temperature over 104° F., or in advanced pregnant sows.

Its advantage is the lasting immunity.

Its disadvantages are:

1. Must not be used on animals already diseased as it has no curative effect and will aggravate the disease.
2. In sows advanced in pregnancy may cause death of young.
3. Causes fever and shock to the system and may cause death in animals highly susceptible to the disease.
4. In the use of virus, hog cholera is brought directly into the herd.
5. By underestimating the weight of the animal and dose of serum and virus, by the use of impotent or weak serum, or by carelessness in the handling of the virus, an outbreak of hog cholera may result.

The simultaneous method is not recommended in Montana unless in sections where hog cholera has been prevalent for years. There are very few such sections in Montana, and the Live Stock Sanitary Board desires to discourage the use of this method where hog cholera has never made its appearance, and also in sections where only slight infection has existed. Our conditions are different from the Middle West States. There they have had hog cholera for many years. Their farms have been thoroughly contaminated with hog cholera infection. Their danger from the use of virus is slight compared to the danger of its use in a virgin hog-raising state like Montana. In time conditions may change, but at the present we encourage sanitation and serum alone and discourage the simultaneous method.

The combination method consists in the use of the serum alone treatment followed in ten to fourteen days by the simultaneous method. This procedure is safer than the simultaneous method. Where hog cholera is prevalent, it may be used in

exposed herds and also in valuable breeding animals where an active immunity is desired. While this method is safer than the simultaneous method, it possesses its disadvantages only in a lesser degree, and the increased cost makes it impracticable excepting in valuable animals.

Dose Table.

Weight of Animal	Serum Alone		Simultaneous Method		
	Serum		Serum		Virus
10 to 15 lbs.....	10	c. c.....	15	c. c.....	0.3 c. c.
15 to 25 lbs.....	15	c. c.....	20	c. c.....	0.5 c. c.
25 to 50 lbs.....	20	c. c.....	25	c. c.....	0.5 c. c.
50 to 75 lbs.....	25	c. c.....	30	c. c.....	0.75 c. c.
75 to 100 lbs.....	30	c. c.....	40	c. c.....	1.0 c. c.
100 to 150 lbs.....	35	c. c.....	50	c. c.....	1.0 c. c.
150 to 200 lbs.....	40	c. c.....	60	c. c.....	1.5 c. c.
200 to 250 lbs.....	45	c. c.....	70	c. c.....	1.5 c. c.
250 to 300 lbs.....	50	c. c.....	80	c. c.....	2.0 c. c.
Over 300 lbs.....	60	c. c.....	90	c. c.....	2.0 c. c.

Hogs already infected with cholera and having a fever of 104° F. or more should receive 25 to 30 per cent more serum than those not infected.

Sucking pigs, as long as they partake only of milk from immune sows, are immune to hog cholera. As soon as they partake of other food they become susceptible. The serum alone treatment may be used on pigs any time after they are three days old, but unless hog cholera is actually prevalent in the herd it is inadvisable to vaccinate them until one or two weeks after weaning. At that time, conditions warranting, the simultaneous method may be used.

Dose Table for Pigs.

Weight of Animal	Serum
2 to 3 lbs.....	4 c. c.
3 to 6 lbs.....	6 c. c.
6 to 10 lbs.....	8 c. c.

In the vaccination of hogs, no matter what method is used, extreme care and cleanliness are necessary. See that your serum is obtained from a laboratory licensed by the United States Department of Agriculture. Keep your serum in the original package and in a cool, dark place until you are ready to vaccinate.

Place all syringes, graduates, and basins which may be used in any manner during vaccination, in a large basin or vessel containing lukewarm water. Then boil for fifteen to twenty minutes. Let cool and then use. Glass, if suddenly

placed in or removed from boiling water may break. A small basin containing a 3 per cent solution of Cresol Compound should be handy to disinfect the hypodermic needle after each injection, and to hold syringe when not in use. A large basin containing a 2 per cent solution of Cresol Compound in which the operator may wash his hands should also be near by. Do not aspirate the serum from the original package with the syringe. The serum should be poured into a graduating glass and from there aspirated or sucked into the syringe, providing the needle is thoroughly cleaned and disinfected each time. The serum may be poured directly into the barrel of the syringe. This is made possible by unscrewing the cap and removing the piston. In vaccinating large herds the syringe and graduate glass should be occasionally cleaned by washing in boiling water. Different syringes must be used for serum and virus, and different basins containing antiseptic solutions must be used for serum syringe and virus syringe. Serum and virus must never be mixed together, and must never be injected into the animal at the same place. Bottles containing serum should be kept tightly corked. A cover should be placed over the graduate used for holding the serum to prevent dust and contamination. Serum once poured out of the original package should never be poured back in, and all unused bottles of serum that have been opened should be destroyed. The temperature of each animal should be taken and the thermometer used in taking the temperatures should be washed in a 2 per cent solution of Cresol Compound after each temperature is taken.

Place of Injection.

The injection may be made into the ham in the inner side of the thigh, or into the axillary space, the depression between the chest and the elbow, or in the depression behind the jaw, a little behind and below the base of the ear. The place of injection should be thoroughly cleaned, dried, and painted with tincture of iodine. The injection may be made into the tissue, or may be made subcutaneously. In inserting the needle, pull the skin to one side so that when the needle is withdrawn the puncture in the skin is not directly over that in the muscles. This prevents serum from oozing out and lessens the danger of infection. Not more than 20 c. c. should be injected into any one spot. The needle should not be withdrawn from the skin, but simply withdrawn part way and inserted at a different

angle into the tissues. When the needle is withdrawn the part should again be painted with tincture of iodine and the needle disinfected. The serum syringe used should be a 40 c. c. or 80 c. c. glass barrel syringe, with a number 16 or 17 needle, about one and one-half inches long. The syringe used in injecting virus should be of 2 c. c. or 3 c. c. capacity, with a number 19 gauge needle. The person injecting the serum should not handle the hogs, and should at all times keep his hands absolutely clean. Carelessness on the part of the operator, or impure serum, may result in abscesses at seat of injection.

Do not vaccinate during the middle of the day in hot summer weather. Vaccinate in the cool of the morning or evening. Do not vaccinate just previous to or just after castration, or any operation, unless cholera has actually appeared in your herd.

Restraint of Animals.

Young hogs weighing 100 lbs. or less may be held up by the hind legs, belly forward, head between holder's legs, or they may be placed on a table back downwards, one assistant holding the front legs and the other the hind legs. Where a large number of animals are to be vaccinated it is advisable to make a low table, scooped out like an ordinary trough with a post at each corner. The animal is laid on its back, and legs tied to the post by straps or a half hitch. Large animals and pregnant sows are best handled by slipping a loop over the snout or upper jaw, and snubbing them up close to a post. If large hogs are to be thrown, one attendant should grasp the tail, the other an ear. Holding the animal they reach across the animal's body, one seizing the hind leg and the other the fore leg on the same side. When the animal is thrown on its side and held in this manner usually no further restraint is necessary.

Treatment of Hogs Previous to Vaccination.

If animals are lousy they should be dipped. Clean, disinfected, well ventilated quarters should be furnished, with a liberal supply of straw bedding. Where possible the herd should be split up into groups of ten to fifteen head. This is to avoid confusion in catching the animals and to prevent excitement and resulting fever.

For several days previous to the administration of serum they should be placed on a low diet, and the day previous they should be given only green feed (alfalfa, etc.) with a small quantity of shorts. They may also be given sweet milk, but should not be fed corn, buttermilk, garbage or whole grain. Clean, wholesome water should at all times be available.

Care of Hogs Following Vaccination.

One hour or so after vaccination the animals may be given a light feed. A low wholesome diet as administered just previous to treatment should be continued for several days. Preferably they should be confined in quarters containing fresh clean straw, but if this is impracticable they may be permitted in alfalfa fields, but should not be permitted in grain stubble, or pens or fields in which there are water holes or mud wallows, this to prevent infection gaining entrance at point of injection. They should not be operated on, dipped, excited or fatigued for at least ten days after vaccination.

Losses Following Vaccination.

If care, cleanliness, and directions are properly carried out, very little if any loss should follow vaccination. Impure serum, insanitation, carelessness on the part of the operator or hog owner, and the improper use of virus, may cause considerable loss.

Management of Cholera Herds and Disinfection of Premises.

Do not permit strangers to visit your pens. Either attend to diseased animals yourself or designate a certain employee to do the work. Unless it is absolutely necessary, the person attending the sick hogs should not go near other hogs, or hog pens. If conditions make such a procedure necessary, rubbers or artics and overalls and a jumper should be worn while in the infected pens. These should be removed on leaving the infected pens, disinfected at intervals, and exposed as much as possible to sunlight.

All carcasses must be burned or buried in quick lime.

All animals should be treated with serum alone in full doses. If serum is unavailable, or you live a considerable distance from a post office, or in a district which necessitates considerable time in supplies reaching you, then all apparently healthy hogs, or ones which do not have a fever of 104° or over, should be dipped in a 2 per cent solution of Cresol

Compound and removed to a clean pen or pasture. If you have no Cresol Compound use any dip you have, but Cresol Compound is most effective. Remove the healthy hogs from the diseased area whether you are able to dip or not. All hogs that have been treated with the simultaneous method, or that have suffered from hog cholera, must be dipped in a 2 per cent solution of Cresol Compound just previous to their removal from contaminated to clean premises. No animal which has received the simultaneous treatment should be removed to other premises until at least thirty days have elapsed from day of treatment. After animals have been removed from contaminated pens or sheds all troughs and floors should be scalded with boiling water. The ground should be thoroughly scraped and then sprinkled with quick lime. Manure and scrapings should be mixed with quick lime and buried in a deep hole. Pens and sheds, fence posts, and all implements used in contaminated pens, or for handling diseased hogs or carcasses, must be disinfected with a 3 per cent solution of Cresol Compound to which not more than one and one-half pounds of lime have been added. This disinfectant is best applied by means of a spray pump.

Liquor Cresolis Compositus (U. S. P.), or Cresol Compound, is the most effective disinfectant for hog cholera. It is the only official disinfectant recognized by the Montana Live Stock Sanitary Board for the dipping of hogs following hog cholera or simultaneous vaccination, and for the disinfection of premises contaminated with hog cholera organisms. In dipping, a 2 per cent solution, and in disinfecting, a 3 or 5 per cent solution should be used. To make a 2 per cent solution add 3 oz. of Cresol Compound to the gallon of water; a 3 per cent solution requires 4 oz. to the gallon of water, and a 5 per cent solution 6 oz. of Cresol Compound to the gallon of water.

Foot-and-Mouth Disease.

Foot-and-mouth disease is an acute infectious contagious disease characterized by an initial high fever, followed by small vesicles or blisters that appear principally in the mouth, on the tongue, and under the lips; also in the interdigital space of cloven-footed animals.

The active cause of this disease has never been isolated, although it is claimed to be due to an ultra-microscopic microorganism; that is, a microorganism that passes through the finest filter, and of such minute structure that it cannot be seen with the microscopes now at our command. Whatever the cause may be, we know that it is of an extremely contagious character, and may be carried by immune animals, implements, and utensils used around infected stock; or it may be carried on hides, or in fact in any way that has a direct connection with diseased animals, or with pastures, corrals, or stables that have been used by affected animals.

Cattle are most susceptible, then come hogs and sheep. Man may become infected by handling diseased stock, eating diseased meat, or drinking unboiled, or unpasteurized milk or milk products from a diseased cow. In man the disease runs a very mild course and is not to be feared. In children the disease may be of a more serious type, since gastro-enteritis may follow, causing considerable distress. Horses and chickens are practically immune, although cases have been reported. The chief danger from horses and chickens lies in the fact that they may carry the disease from infected animals or farms to healthy animals.

Foot-and-mouth disease is a very old disease, and from time to time has made its appearance in nearly every country in the world.

The last previous outbreak in the United States occurred in 1908, but due to the active measures taken by the Federal sanitary authorities the disease was completely eradicated in this country. The present outbreak was first discovered at Niles, Michigan, and is supposed to have been introduced on foreign hides, or material used in the tanning of hides. The disease spread with tremendous rapidity, due to its having gained entrance into the stock yards at Chicago by means of a shipment of infected hogs from Michigan.

As has been stated, the first symptom is a high fever, varying from 104 to 106 degrees. This may be followed by a chill, the animal standing off by itself, its back arched, and with a general appearance of distress. If the mouth is examined, small vesicles or blisters may be seen on the tongue, or under the lips. These blisters may be very small, but as the disease progresses they grow larger or run together. There is profuse salivation, or drooling, which increases as the blisters break, and the animal makes a peculiar smacking sound with its mouth much the same as an old person without any teeth might make. There is intense pain and the animal, while usually unable to eat, may make painful efforts to take food, rolling its head around in an effort to swallow. At this period the animal may show signs of lameness, and upon investigation the typical blisters may be seen in the inter-digital space, or just above the top of the hoof. They may also appear on the teats and udder. When the animal lies down it frequently stretches its neck and extends its head parallel with the ground. As the disease progresses the blisters or vesicles break, leaving raw red sores which in many cases may join each other. If the tongue is taken hold of, many times the entire tongue covering will come off on the hands. One of the characteristic signs of foot-and-mouth disease is the sloughing of the affected membranes. In ordinary stomatitis, or sore mouth of calves, or in forage abrasions with infection, the affected part is oftentimes raised and feels hard to the touch; but, as has been said, in foot-and-mouth disease if the blister or raw sore is rubbed, dead tissue will adhere to the hand. If the foot lesions are severe, the entire hoof becomes loose, and in exceptional cases may drop off.

Hogs seldom show the characteristic mouth lesions at first, but they suffer severely with the foot lesions. The disease appears to work very rapidly in them. In the evening they may be running around and eating as usual, but in the morning, while they are perfectly willing to eat, they move with the greatest difficulty. They may not be able to stand up, but move around on their knees. The soles of their feet are swollen and hot, and the animal shows every sign of intense pain. Lesions may be later found in the mouth, but in hogs the foot lesions are generally the first symptoms noticed.

Sheep are not so susceptible as cattle or hogs, but when they do become affected the foot lesions predominate.

Foot-and-mouth disease in its initial stages is rather hard to diagnose, but as the disease progresses it may be easily recognized by the observant stockman. There is nothing hidden about it in its advanced stages; it is acute, develops fast, and when once seen will never be forgotten.

European writers claim the period of incubation, or time elapsing between the time the animal becomes infected and the time the first symptoms appear, is from two to ten days, but our observations show us that the first symptom may not appear until fourteen or sixteen days (or even longer) after the animal has become infected. This has also been observed by the Federal authorities, as they have just issued an order to quarantine all exposed animals for a period of not less than twenty-five days. This lengthened period of incubation may be accounted for as being due either to the naturally healthy condition of cattle in this country, or to the weakened condition of the virus or causative agent of foot-and-mouth disease.

European writers claim that foot-and-mouth disease takes two forms—a mild form in which the mortality seldom reaches more than 1 per cent, and a malignant form in which the mortality reaches 50 to 70 per cent. In European countries where the disease has gained a foothold, and where the herds are small, and where, in many cases, the animals are cared for much the same as members of the family, and strict police quarantine can be maintained, treatment for this disease is recommended. Ordinary antiseptic, tonic, and sanitary treatment effects a cure in the mild form of foot-and-mouth disease in from ten to fourteen days. Vaccination and immunization have also been tried, but the results so far have been far from satisfactory. In many instances serious losses have resulted from the treatment, so that in this country where we have large herds, open range, and where the disease has not gained a permanent foothold, the treatment naturally resolves itself into a matter of economics. We have found, in all our previous outbreaks, that it is cheaper to destroy all diseased and actually exposed animals than to try and treat them, and run the risk of permanent infection. This is illustrated by the recent importation of live stock into Montana that was affected with foot-and-mouth disease. In this instance, when the shipment was unloaded at the railroad yards at Glendive, 105 head were visibly diseased. The remainder of the shipment showed no signs of disease, and their only exposure had been en route.

at the Sunnyside feed yards. The entire shipment was held in quarantine in the railroad yards, and in a few days cattle in the different pens showed symptoms of the disease. The Federal authorities, in conjunction with the State authorities, ordered these animals destroyed. The destruction of property is always an unpleasant task, and one which a sanitarian only resorts to for the ultimate welfare of the live-stock industry. As a rule, where there is any possibility of saving an animal's life, or where the animal can be of use without endangering the public health, I am opposed to their destruction; but in this case the animals were of a poor grade, and it was much better policy to destroy them, taking an actual known loss, than to run the risk of permanently infecting our ranges and live stock, by permitting the infected or exposed animals to go forward to their destination and trying to effect a cure by medical treatment.

There seems to be considerable misunderstanding regarding the mortality from foot-and-mouth disease; and while it is impossible to state what the mortality would be in this country, as the disease has never been allowed to run its course, from what we have seen of it I am confident that in Montana the mortality would be fairly high, especially if the disease was prevalent during the winter months. You can very easily imagine what would happen to an animal that was unable to eat and could only walk with the utmost difficulty, especially if the weather should be bad. But whether or not the disease is fatal to the affected animal, there is one thing I am fairly positive of, and that is it would be fatal financially to our live-stock industry. The animals lose weight very fast, and in affected cows the milk supply is diminished and unfit for use, and as one attack does not render the animal immune and is said to be recurrent in many cases, to have this disease in our live stock would mean a series of perpetual quarantines.

We know that the cause of this disease is destroyed in a few hours by sunlight, so that on our open ranges there is not so much danger of it spreading; but our only course is to destroy all diseased and actually exposed animals and to thoroughly clean and disinfect all infected premises. Where practical and possible, it is also advisable to burn over pastures that have been used by infected animals, as when covered over and not exposed to the direct rays of sunlight the causative agent may live for many months. Cold weather has a retardative effect on the virulency of the disease, but it is doubtful if it destroys the microorganism or causative agent.

The Pasteurization of Milk.

Pasteurization as applied to milk consists in heating it to an appropriate temperature below the boiling point followed by rapid chilling.

There are two methods of pasteurization, one called the "flash" pasteurization, which consists in heating the milk to approximately 175° F., followed by rapid chilling. This method is unsatisfactory, is productive of carelessness, and renders a large percentage of the albumen insoluble. The second method is called the "holding process." This consists in heating the milk to 145° or 150° F., holding it at that temperature for twenty to thirty minutes, and then rapidly chilling it. This process is to be recommended, and all milk which is not produced under the most scrupulous sanitary conditions should be treated in this manner. This method does not produce any appreciable chemical change in the milk, and although all disease-producing microorganisms, or 99.93 to 99.99 per cent of them, are destroyed by this method of pasteurization, it does not destroy the natural bacteria and enzymes of the milk.

Pasteurized milk does not necessarily mean clean milk; it simply means milk free from living disease-producing organisms. Naturally it would be much better to be able to supply a scrupulously clean, pure milk, but of all foodstuffs milk is the most difficult to preserve pure and handle with success. "It requires not only intelligence," says Dr. Rosenau, "but a high degree of technical training, as well as constant vigilance, to produce a clean, pure, safe milk;" so that while constant vigilance should be maintained and every precaution taken to secure the production of clean, pure milk in the first place, for neither pasteurization nor clarification can atone for filth, yet just so long as milk is apt to be a carrier of disease-producing microorganisms, our only defense is to destroy them with heat.

It has been claimed that pasteurization destroys certain values in milk, but this has not been proven by late investigation. Dr. Rupp, in 'Bureau of Animal Industry Bulletin No. 166, makes the following statement:

"1. Milk pasteurized by the holder process at 62.8° C. (145° F.) for 30 minutes does not undergo any appreciable chemical change.

"2. The soluble phosphates of lime and magnesia do not become

insoluble. At 68.3° C. (155° F.) the quantity of phosphoric acid, lime and magnesia in the serum of both raw and pasteurized milk is practically the same.

"3. The albumen does not coagulate at 62.8° C. (145° F.), but at 65.6° C. (150° F.) 5.75 per cent of the albumen is rendered insoluble. As the temperature increases the amount of coagulated albumen increases. At 68.3° C. (155° F.) the quantity increases to 12.75 per cent, and at 71.1° C. (160° F.) it amounts to 30.78 per cent.

"4. The time required for coagulating the casein by rennin is slightly less in milk pasteurized up to 65° C. (149° F.) than in raw milk. At 70° C. (158° F.) there is a slight retardation, while at 75° C. (167° F.) the time has almost doubled.

"5. The acidity as determined by titration is slightly diminished in pasteurized milk."

Investigations have shown that milk is the carrier of organisms that in many cases cause indigestion and intestinal trouble. This is strikingly illustrated by the following extract from the 1912 annual report of Dr. A. D. Melvin, Federal Bureau of Animal Industry, which refers to the United States Naval Academy at Annapolis, Md.:

"Paymaster Bryan has compiled figures showing the health of the midshipmen for one year before and one year since the installation of the Academy herd. Taking into account only illness of a digestive or intestinal character and counting each day that a midshipman was sick or excused on this account, it is found that during the year from October 1, 1910, to September 30, 1911, with milk from outside sources, the sick days numbered 1,598, or an average of 133 a month; while the following year, with milk from the Academy herd, there were only 296 (sick days) averaging less than 25 a month. For more than two months (including September and October, 1912) there has not been a single case of illness of the character mentioned. The number of midshipmen at the Academy was practically the same each year, ranging from about 750 for the greater part of the year to about 250 during the summer. The great decrease in illness from digestive disturbance is attributed entirely to the better quality of milk, as other dietary conditions have remained unchanged."

If this was true of the Naval Academy milk supply, may it not also be true of our supply, which cannot be produced under military discipline with the constant aid of Federal scientists?

The following directions for the home pasteurization of milk, by L. A. Rogers of the Bureau of Animal Industry, are recommended for those who desire pasteurized milk and who are unable to buy it on the open market:

"Milk is most conveniently pasteurized in the bottles in which it is delivered. To do this use a small pail with a perforated false bottom.

An inverted pie-tin with a few holes punched in it will answer the purpose. This will raise the bottles from the bottom of the pail, thus allowing a free circulation of water and preventing bumping of the bottles. Punch a hole through the cap of one of the bottles and insert a thermometer. The ordinary floating type of thermometer is likely to be inaccurate, and if possible a good thermometer with the scale etched on the glass should be used. Set the bottles of milk in the pail and fill the pail with water nearly to the level of the milk. Put the pail on the stove or over a gas flame and heat it until the thermometer in the milk shows not less than 150° nor more than 155° F. (We recommend not less than 145° and not more than 150° F.) The bottles should then be removed from the water and allowed to stand from twenty to thirty minutes. The temperature will fall slowly, but may be held more uniformly by covering the bottles with a towel. The punctured cap should be replaced with a new one, or the bottle should be covered with an inverted cup.

"After the milk has been held as directed it should be cooled as quickly and as much as possible by setting in water. To avoid danger of breaking the bottle by too sudden change of temperature, this water should be warm at first. Replace the warm water slowly with cold water. After cooling, milk should in all cases be held at the lowest available temperature.

"This method may be employed to retard the souring of milk or cream for ordinary purposes. It should be remembered, however, that pasteurization does not destroy all bacteria in milk, and after pasteurization it should be kept cold and used as soon as possible."

For those who are interested in the milk question and who desire further knowledge along these lines, the following bulletins are recommended:

Hygienic Laboratory, Bulletin No. 56.

Issued by Government Printing Office, Washington, D. C.
Bureau of Animal Industry Bulletin No. 166.

Issued by Government Printing Office, Washington, D. C.
The Solution of the Milk Problem, by George L. Magruder,
M. D.

Published by R. Beresford, Washington, D. C.

The Intra-Dermal Tuberculin Test for Diagnosing Tuberculosis in Animals.

The intra-dermal test is a saver of time and energy, and permits the testing of many more cattle without a greater expenditure of money. In Montana, for the testing of dairy cattle, the subcutaneous method with the taking of six ante and six post-temperatures is not only impracticable and very expensive, but is demoralizing to the veterinarians employed on this work. In the subcutaneous method it takes just as long to test two cows as it would fifty; and unless the owners bunch their cattle together, which they naturally object to in the outlying districts, it takes a veterinarian one month to do work which he could do in two or three days by using the intra-dermal method. In the subcutaneous method temperatures must be taken every two hours, and the first post-temperature must be taken not later than eight hours after the time of injecting the tuberculin. This means the dairyman must keep his cattle in their stalls for two days, and also means that the veterinarian must be on the ground practically constantly for two days, starting his work at five or six o'clock in the morning and not finishing until ten o'clock at night. You can very readily imagine that this is far from pleasant for the veterinarian, especially if he happens to be out in the country testing a very small herd and the owner is not agreeable to the test.

In the intra-dermal test much more care and professional judgment is required, but I am satisfied if adopted it will be productive of much more efficient work on the part of the veterinarians, and will be much more agreeable to the owners of cattle. The cattle will not have to be kept in their stalls; they may be turned out and watered and fed as usual. The veterinarian need not stay at the dairy barn longer than it takes him to make a physical examination of the animals and inject one or two drops of tuberculin into the caudal fold. The intra-dermal method causes a local skin reaction, and not a general reaction as occurs in tuberculous animals subjected to the subcutaneous test. In the subcutaneous test 2 c. c. or more of tuberculin is used; in the intra-dermal test, only 1 or 2 drops. Again, a positive reaction is easily discernible by the owner as the photo depicts—



Positive Reactor to Intra-dermal Test Showing Swelling Under the Tail.

Photo by H. Welch

Regarding the technique of the intra-dermal method, I quote from an article by Prof. Clarence M. Haring, of Berkeley, Cal.:

"The manner in which this test differs from the usual subcutaneous test is that the tuberculin is injected into the deeper layers of the skin. The most suitable place to make this injection is in one of the folds of the skin on the under side of the base of the tail. We have used the skin of the neck in some of our tests, but find the subcaudal fold more convenient. The skin here is free from hair and is soft and pliable. A hypodermic syringe with a short needle-point should be used. A suitable hypodermic syringe is a 25 or 26 gauge needle with a point three-sixteenths to a quarter of an inch in length such as dentists use for injecting local anesthetics.

"The subcaudal fold is grasped between the thumb and first two fingers of the left hand and the needle inserted horizontally into the thickness of the skin grasped between the thumb and fingers. The 1-10 or 1-5 c. c. dose, if properly placed, can be felt in the layers of the skin as it is expelled from the syringe, where it remains as a small lump in the skin after the needle has been removed. In our first tests we made the mistake of trying to inject as near the surface of the skin as possible. It is difficult to inject into the layers of the epidermis and an injection into this part of the skin is of little diagnostic value. In case the needle is of the proper length, namely, one-quarter of an inch, there is little danger of going completely through the skin. When the proper point in the subcaudal fold is selected, it makes little difference whether the point of the needle is in the derma or in the subdermal connective tissue. With the proper syringe an expert operator can inject in the dark as accurately as in a good light. We have found that characteristic reactions occur with the injections from a long needle, placed completely through and beneath the skin layers

of the subcaudal fold. On this account it is well to inject at a point on the fold about two and a half or three inches down the tail from the anus.

"After successfully using the intra-dermal method on 1,500 head of cattle Longley has expressed the opinion that it is impossible to inject into the skin proper, but that the dose goes into the subdermal connective tissues. From experiments which we have made on the hides of recently killed animals, we think he must have meant the epidermis. When a one-quarter inch needle is inserted slightly horizontally into the subcaudal fold it rarely penetrates deeper than the lower layers of the dermis or true skin.

"In injecting cattle that are secured in stanchions, a convenient way is to stand by the side of the cows, pressing the knee into the animal's flank, and grasping the loose fold of skin from under the tail, without raising the tail. Some operators, when injecting, prefer to stand directly behind the cow, but this method is impracticable except with very docile cattle or when an assistant is available to steady the animal and keep her from moving from side to side.

"We deem it impracticable to disinfect or otherwise prepare the subcaudal fold for the intra-dermal injection, except when it is soiled. In such cases, wipe the fold clean with a rag, apply 50 per cent alcohol with absorbent cotton and wipe with dry cotton. Before injecting each animal, the syringe needle should be dipped in strong disinfectant and wiped dry with sterile absorbent cotton. After dipping the needle in an irritating disinfectant, take pains to wipe it off before inserting it for fear the disinfectant may cause irritation and produce a swelling which might be mistaken for a reaction.

"The application of strong disinfectants at the point of intra-dermal injection should be avoided. In several instances we have observed swellings, varying in size from a hazlenut to a hen's egg, on the subcaudal fold as a result of the application of strong lysol solution. These might have been mistaken for reactions but for the fact that the cattle were not injected with tuberculin."

Official Disinfectants and Dips.

Official Disinfectants.

In disinfecting cars and yards the following disinfectants are permitted by the Bureau of Animal Industry:

1. A 5-per cent solution of crystal carbolic acid.
2. A 3-per cent solution of cresol compound, U. S. P.
3. A 3-per cent solution of said cresol solution, prepared by the Barrett Manufacturing Co., Frankford, Philadelphia, Pa.
4. A 3-per cent solution of Cooper's fluid dip (William Cooper & Nephews, Chicago, Ill.).
5. A 1 to 1000 solution of mercuric chloride.
6. Chloride of lime, U. S. P., 1 pound to 1½ gallons of water.
7. Formaldehyde solution, 40 per cent, 1 quart to 5 gallons of water.

If lime is added, not more than 1½ pounds must be used for each gallon of solution.

Official Dips for Scabies in Cattle.

Beaumont oil.

Lime and sulphur mixed according to B. A. I. formulas.

Official Dips for Sheep.

Lime and sulphur.

Tobacco dips which contain 0.07 per cent of nicotine.

Live Stock Sanitary Board Orders.

Order No. 1.

All stallions in Dawson and Custer Counties and other localities where dourine is suspected shall be blood tested for dourine.

No mares shall be shipped out of Dawson or Custer Counties, or from any locality where dourine is suspected, until they shall have been released by the State Veterinary Surgeon or an Inspector of the United States Bureau of Animal Industry.

No mares shall be released until all stallions to which any of the mares may have been bred shall have passed a satisfactory test for dourine.

All stock inspectors and sheriffs are earnestly requested to co-operate with this department and not permit the movement of any mares or stallions from Dawson or Custer Counties, or other localities where the disease exists, until such animals shall have been released by the State Veterinary Surgeon or an Inspector of the United States Bureau of Animal Industry.

April 26, 1913.

Order No. 2.

Whereas, It has come to the knowledge of this Board that dourine exists in the State of Montana, and, upon investigation, it is hereby determined that the said disease does exist; and,

Whereas, The Board is authoritatively informed that it is the intention of the United States Government to immediately quarantine the State of Montana in case such disease is not eradicated, or confined, or stallions prevented from running at large;

THEREFORE, IT IS HEREBY ORDERED, That no stallions shall run at large within the following described area, and no mares shall be bred within the following described area until their stallions have been tested and found free from disease, and no mare that has been exposed to dourine shall be bred until it has been blood tested for dourine and released; and,

IT IS FURTHER ORDERED, That all owners of stallions and mares shall, when demanded to do so by the State Veterinary Surgeon or his deputy, gather all their stallions and mares and have them at a given place on a date named by the State Veterinary Surgeon or his deputy, for the purpose of having the same tested and examined; and,

IT IS FURTHER ORDERED, That all stallions within the following described area shall be gathered and held in restraint not later than August 1, 1913, and on and after that date the State Veterinary Surgeon be, and is hereby authorized to gather all stallions found running at large on the open range in violation of law, and to castrate them, and, if found diseased, to castrate or destroy them, the expense thereof to be borne by the owner of such stallions:

"Beginning at the point of crossing the Montana-Dakota line, in Custer County, by the Chicago, Milwaukee & St. Paul Railway; running in a westerly direction along the Chicago, Milwaukee & St. Paul Railway to the mouth of Sandstone Creek; up Fallon Creek to Cottonwood; up Cottonwood; thence in a westerly direction to the head of Horse Creek; down Horse Creek to the Powder River; thence in a northerly direction, following the course of the Powder River to the Yellowstone River; thence in a westerly direction along the Yellowstone River to the mouth of Sunday Creek; up Sunday Creek to 106 West Longitude; thence north to Timber Creek; down Timber Creek to the Big Dry; thence down the Big Dry to the Missouri River; thence in an easterly direction to the North Dakota line; thence south along the Dakota line to the point of origin."

IT IS FURTHER ORDERED, That no stallion in a herd where dourine has been discovered shall be allowed to run at large on the public range, even if such herd is not within the above restricted district.

July 14, 1913.

Amended by Order No. 4.

Order No. 3.

Regulations providing for the admission of live stock into the State of Montana that originates in the State of South Dakota.

To All Railroad Officials and Others:

In accordance with Section 1888, Revised Codes of Montana, 1907, the following regulation is hereby established by the Live Stock Sanitary Board to govern the admission into the State of Montana of live stock that originated in the State of South Dakota:

All live stock originating in the State of South Dakota, destined to the State of Montana, must be accompanied by a certificate of inspection issued by a Veterinary Inspector of the United States Bureau of Animal Industry, or a veterinarian approved by the United States Bureau of Animal Industry for Canadian mallein testing. Said inspection to be made in accord with requirements issued June 1, 1913.

All said live stock not accompanied by a certificate of inspection as above stated must be held at the State Line and inspected by an inspector of the United States Bureau of Animal Industry, or an agent of the Montana Live Stock Sanitary Board, the expense of said inspection to be paid by the owner of the stock.

September 23, 1913.

Order No. 4.

On and after November 1, 1913, that part of Order No. 2, issued by the Live Stock Sanitary Board of Montana on July 14, 1913, prohibiting stallions from running on the open range in a certain designated area, is hereby amended to read as follows:

"IT IS FURTHER ORDERED, That all stallions within the following described area shall be gathered and held in restraint not later than November 1, 1913, and on and after that date the State Veterinary Surgeon be, and is hereby authorized to gather all stallions found running at large on the open range in violation of law, and to castrate them, and if found diseased, to castrate or destroy them, the expense thereof to be borne by the owner of such stallions.

"All of Dawson County; all of Custer County north of the Yellowstone River, and all that part of Custer County south of the Yellowstone River and east of the Powder River."

September 23, 1914.

Amended by Order No. 9.

Order No. 5.

Regulations Relative to Tuberculosis in Cattle.

1. All tubercular animals, or animals reacting to the tuberculin test, must be segregated immediately.

2. All stables, corrals and barns where tubercular animals are known to have been housed, must be thoroughly disinfected under the personal supervision of an inspector of the Live Stock Sanitary Board. This disinfection must take place within five days after the registered quarantine notice is given the owner, unless special permission is received from the State Veterinary Surgeon.

3. No employee or person shall be allowed to handle or milk diseased cattle and thereafter handle or milk healthy cattle, unless he or she change their clothing and thoroughly wash and cleanse their hands.

4. Unless the owner or person in charge of reacting animals makes a written request within ten days after registered quarantine notice has been mailed, that he or she desires to employ the Bang System or hold the animals in quarantine for other lawful purpose, all reactors to the tuberculin test shall be ordered destroyed by the State Veterinary Surgeon.

5. At the discretion of the State Veterinary Surgeon, a reasonable time (which time is to be determined by the State Veterinary Surgeon) may be given the owner to confine and isolate away from all other animals and quarantine in a suitable place all reactors to the tuberculin test, or cattle known to be diseased with tuberculosis.

6. No milk or dairy product from a tubercular animal, or an animal that has reacted to the tuberculin test, shall be used for human consumption.

7. No milk or dairy product from a tubercular animal, or an animal that has reacted to the tuberculin test, shall be used for feeding any animal, until after such milk has been properly pasteurized.

8. Any violation of the rules and regulations of the Live Stock Sanitary Board will necessitate the immediate slaughter of all reacting animals.

September 23, 1913.

Order No. 6.

1. Whenever the Board, when in session, or the State Veterinary Surgeon, when the Board is not in session, after investigation, determines that an emergency exists in any part of the State demanding the same, it or he may direct and proceed at once to seize and immediately castrate any stallion found running at large contrary to law, without holding the same for five days or for any time.

2. The State Veterinary Surgeon be, and is hereby authorized to gather all stallions found running at large on the open range in violation of law, and to castrate them, and, if found diseased, to castrate or destroy them, the expense thereof to be borne by the owner of such stallions.

3. All owners of stallions or mares shall, when demanded to do so by the State Veterinary Surgeon or his deputy, gather all their stallions and mares and have them at a given place on a date named by the State Veterinary Surgeon or his deputy, for the purpose of having the same tested or examined.

4. No animal shall be bred in any restricted district until the stallion has been tested and found free from disease, and no mare that has been exposed to dourine shall be bred until she has been blood tested and released.

5. Whenever it shall be determined necessary by the State Veterinary Surgeon or his deputy, all owners of animals tested for dourine shall immediately brand such animals with a number so as to identify same, with the number on such part of such animal as may be determined by the State Veterinary Surgeon or his deputy.

6. Any animal reacting to the blood test for dourine shall be immediately branded by the owner with a "D" on the left jaw. All mares afflicted with dourine shall be destroyed, and all stallions shall either be destroyed or castrated subject to the approval of the State Veterinary Surgeon. No animal

so castrated shall be released from quarantine within a period of six weeks, and no animal afflicted with dourine shall be allowed to run on the open range.

July 14, 1913.

Order No. 7.

Regulations Governing Tuberculin Reactors Held in
Quarantine.

1. Owner or agent in charge must file with the State Veterinary Surgeon a written request for permission to hold tuberculin reactors in quarantine.

2. Owner or agent in charge must file with State Veterinary Surgeon a list containing names and description of all cattle held in quarantine.

3. Owner or agent in charge must report in writing the death or disposal of any animal quarantined.

4. When the "Bang" or other system of breeding out tuberculin reactors is employed, the owner or agent in charge must within thirty days report in writing to the State Veterinary Surgeon all animals bred to a tuberculin reactor, and all animals bred must be held in quarantine until tuberculin tested and released by the State Veterinary Surgeon. All calves sired or calved by a tuberculin reactor must likewise be held in quarantine and tuberculin tested before being released.

5. When the "Bang" or other system of breeding out tuberculin reactors is employed, the expense of tuberculin testing shall be borne by the Live Stock Sanitary Board, provided the services of a deputy state veterinarian for such tuberculin test are not necessary or requested oftener than once in every six months; and provided further, that animals so quarantined shall have been in the State of Montana one hundred and eighty days or more previous to their reacting to the tuberculin test. Where the services of a deputy state veterinarian are necessary or requested oftener than once every six months for testing any or all of a quarantined herd, and where animals have not been in the State of Montana one hundred and eighty days or more previous to their reacting to the tuberculin test, then the owner must pay all necessary expenses pertaining to such test.

September 21, 1914.

Order No. 8.

Regulations Governing the Sale, Distribution and Use of Anti-Hog Cholera Serum, also the Sale, Distribution and Use of Serum and Virus Within the State of Montana.

1. All anti-hog cholera SERUM sold within the State or imported into the State of Montana for sale, distribution or use, shall be produced under a license issued by the United States Bureau of Animal Industry, Department of Agriculture.

(a) The use of anti-hog cholera SERUM is not restricted in any way.

2. The sale, distribution or use of VIRUS shall be prohibited except under the following conditions, to-wit:

(a) All VIRUS used for immunizing hogs against cholera shall be administered by veterinarians who are graduates of recognized veterinary colleges, or by owners to whom a permit will be issued by the State Veterinary Surgeon upon being furnished with proof of the fact that such owners are qualified to administer VIRUS without danger of spreading the contagion of hog cholera. In all cases the use of VIRUS by laymen shall be limited to hogs owned by the person to whom the permit is granted.

(b) No VIRUS shall be shipped into the State or sold or distributed within the State of Montana unless consigned, sold or distributed to a licensed graduate veterinarian or owner holding permit from the State Veterinary Surgeon.

(c) All hogs subjected to the simultaneous method of immunization, together with all yards, corrals, sheds or feed lots to which said hogs have access (which corrals, yards, sheds, or feed lots must not be adjoining a public highway), must be quarantined for a period of not less than thirty days. Conspicuous notice of quarantine shall be posted upon said premises in the form of a placard bearing the words "HOG CHOLERA HERE" in letters not less than 2½ inches in size.

(d) All hogs subjected to the simultaneous method of immunization must be dipped in one of the standard recognized dips before being released from quarantine, and all yards, corrals, sheds or feed lots to which said hogs have had access must be thoroughly cleaned and disinfected. Dipping of hogs, cleaning and disinfecting of yards, corrals, sheds or

feed lots must be done under the supervision of a representative of the Live Stock Sanitary Board.

3. Veterinarians and licensed owners administering SERUM and VIRUS shall immediately render full reports to the State Veterinary Surgeon, giving names and addresses of owners and number of hogs treated.

September 21, 1914.

Order No. 9.

On and after November 1, 1914, that part of Order No. 2, issued by the Live Stock Sanitary Board of Montana on July 14, 1913, and all of Order No. 4, prohibiting stallions from running on the open range in a certain designated area, is hereby amended to read as follows:

"IT IS FURTHER ORDERED, That all stallions within the following described area shall be gathered and held in restraint not later than November 1, 1914, and on and after that date the State Veterinary Surgeon be, and is hereby authorized to gather all stallions found running at large on the open range in violation of law, and to castrate them, and, if found diseased, to castrate or destroy them, the expense thereof to be borne by the owner of such stallions.

"All of Dawson County; all of Custer County.."

September 21, 1914.

Order No. 10.

1. In the subcutaneous tuberculin test not less than three ante-temperatures at intervals of not more than four hours and not less than two hours, and not less than four post-temperatures beginning at not less than six hours and not more than ten hours after injection, at intervals of not less than two hours and not more than three hours, must be taken by the deputy state veterinary surgeon making the test. In all tests the taking of post-temperatures must be carried out until the twentieth hour, at which time, if there is no tendency for the temperature to rise, the test may cease.

2. The intra-dermal test is hereby adopted as an official test for tuberculosis in cattle.

In the intra-dermal tuberculin test the injection must be made in the caudal folds or some such suitable place. The injection must be made intra-dermally. The post-inspection should be made at approximately the seventy-second hour, and, if necessary, another inspection made at the ninety-sixth hour.

In accordance with Chapter 146, Session Laws of the 12th Assembly, the State is divided into the following four tuberculin testing districts:

District No. 1.

Teton (South of Birch Creek and Marias River), Choteau, Lewis and Clark, Cascade, Fergus, Broadwater, Meagher, Gallatin, Park, Sweetgrass.

District No. 2.

Sanders, Missoula, Powell, Ravalli, Granite, Deer Lodge, Beaverhead, Silver Bow, Jefferson, Madison.

District No. 3.

Lincoln, Flathead, Teton (North of Birch Creek and Marias River), Toole, Hill, Blaine, Valley, Sheridan.

District No. 4.

Musselshell, Stillwater, Carbon, Yellowstone, Big Horn, Rosebud, Dawson, Custer, Fallon, Wibaux, Richland.

Order No. 11.

The order issued January 22, 1912, by the Montana Live Stock Sanitary Board prohibiting the importation of live stock into the State of Montana from the State of Illinois, unless accompanied by a certificate issued by a veterinary inspector in the employ of the United States Bureau of Animal Industry, is hereby rescinded.

On and after October 1, 1914, the Live Stock Sanitary Board of Montana will accept shipments from Illinois accompanied by either federal certificates or certificates issued by recognized veterinarians indorsed and approved by the Live Stock Sanitary Board of Illinois.

September 21, 1914.

Circular No. 8.

The following official charges for interstate inspection of live stock have been adopted by the Live Stock Sanitary Board:

Sheep, physical inspection, \$8.00 per diem and expenses.

Cattle, physical inspection, \$8.00 per diem and expenses.

Swine, physical inspection, \$8.00 per diem and expenses.

(If inspection is made in resident city or town of veterinarian making same, three cars or under shall be classified as one-half day).

Swine, immunization \$0.25 per head (Owner to furnish serum, help, and incidental materials).

Horses, physical inspection, \$2.50 per car and expenses. (Minimum charge of \$5.00).

Horses, mallein testing.

When test is made in other locality than resident city or town of veterinarian conducting test, \$1.00 per head and all necessary expenses with a minimum charge of \$15.00.

When test is made in resident city or town of veterinarian conducting the test, the charges will be:

One animal\$ 5.00

Two animals\$10.00

Three to fifteen animals\$15.00

Fifteen head and over, per head.....\$ 1.00

Tuberculin testing:

Charges will be the same as for mallein testing.

Disinfecting stock cars:

\$8.00 per diem and expenses.

When two or more inspections are made at different points in one day, two days may be charged.

September 23, 1913.

SUMMARY
OF
WORK

SUMMARY.

Dourine Investigations Synoptically Arranged—1913.

Total No. horses inspected for dourine	16,650
Comp.-Fix. tested	9,522
Reactors to test	965
Destroyed or castrated	665
Remaining	300
Percentage of reactors to the complement-fixation test....	.101

Glanders—1913.

Total No. horses inspected for glanders	1,648		
Mallein tested	332	Reactors	76
Comp-Fix. tested	212	Reactors	49
Clinically Cond.	34	Reactors	34
Examined and found free.....	1,070	Reactors held in from 1912....	3
<hr/>			
Total No. condemned animals	162		
Destroyed during 1913	148		
<hr/>			
Remaining in quarantine	14		

Interstate Shipments—1913.

Total No. horses inspected for interstate shipment.....	7,738
Mallein tested .....3,677	Reactors 1
Clinically inspected .....4,061	

Miscellaneous.

Total No. horses inspected for various other diseases.....	574
Total No. horses inspected during 1913.....	26,610

SUMMARY.

Dourine Investigations Synoptically Arranged—1914.

Total No. horses inspected for dourine	43,015
Comp.-Fix. tested	41,796
Reactors during year	1,104
Reactors carried over from 1913	300
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Total No. reactors	1,404
Destroyed, castrated, etc.	943
<hr/>	
Remaining	461
Percentage of reactors to complement-fixation test026

Glanders—1914.

Total No. horses inspected for glanders	2,055		
Mallein tested	1,157	Reactors	59
Comp.-Fix. tested	542	Reactors	41
Clinically Cond.	8	Reactors	8
Remaining from 1913	14	Reactors	11
<hr/>			
Total No. condemned animals	122		
Destroyed during 1914	121		
<hr/>			
Remaining in quarantine	1		

Interstate Shipments—1914.

Total No. horses inspected for interstate shipment.....	8,307
Mallein tested	4,813
Clinically inspected	3,494
No reactors.	

Intrastate Shipments—1914.

Total No. horses inspected for intrastate shipment.....	102
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Miscellaneous—1914.

Total No. horses inspected for various diseases	1,390
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Total No. horses inspected during 1914.....	54,869

CATTLE INVESTIGATIONS—1913.

For Tuberculosis.

Total No. tuberculin tested		6,769
No. reacting	371	
No. destroyed	359	
	<hr/>	
No. remaining	12	
Percentage of reactors to the tuberculin test.....		.054

Interstate Shipments—1913.

Total No. cattle tested for interstate shipment.....		3,263
Tuberculin tested	104	
Clinically inspected	3,159	
No. cattle inspected for miscellaneous diseases.....		3,502
	<hr/>	
Total No. cattle inspected during 1913.....		13,534

CATTLE INVESTIGATIONS—1914.**For Tuberculosis.**

Total No. tuberculin tested	5,788
No. reacting	174
No. destroyed	161
.....	
No. remaining	13
Percentage of reactors to the tuberculin test.....	.03

Interstate Shipments—1914.

Total No. cattle tested for interstate shipment.....	11,174
Tuberculin tested	287
Clinically inspected	10,887

Intrastate Shipments—1914.

Total No. cattle inspected for intrastate shipment.....	424
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Cattle Scab—1914.

Total No. inspected for cattle scab	5,872
No. exposed to disease	321
No. dipped	3,380

Miscellaneous—1914.

No. cattle inspected for miscellaneous diseases	2,303
.....	
Total No. cattle inspected during 1914.....	25,564

Blackleg Vaccine Distributions—1913.

Total No. applications received	382
Total No. applications filled	382
Total No. doses blackleg vaccine distributed	40,725

Swine—1913.

Total No. swine inspected during 1913	1,908
Examined for hog cholera	1,770
Examined for interstate shipment	138

Sheep—1913.

Total No. sheep inspected during 1913	228,658
Inspected for lip and leg ulceration	28,160
Found infected	4,325
Bucks inspected for release	9,250
Dipped for ticks	2,700
Inspected for interstate shipment	131,083
Inspected for intrastate shipment	504
Inspected for quarantine release	1,246
Inspected for miscellaneous diseases	9,007
Goats dipped for ticks	160
Imported sheep, as per regulations	46,548

Blackleg Vaccine Distributions—1914.

Total No. applications received	594
Total No. applications filled	594
Total No. doses blackleg vaccine distributed	62,420

Swine—1914.

Examined for hog cholera and other diseases	4,533
No. immunized	1,354
Examined for interstate shipment	478
Total No. swine inspected during 1914	5,011

Sheep—1914.

No. inspected for various diseases	100,827
No. dipped	7,288
Bucks inspected for release	3,005
Inspected for interstate shipment	174,052
Inspected for intrastate shipment	15,432
Total No. sheep inspected during 1914	293,316

Foot-and-Mouth Disease—1914.

Total No. animals inspected for foot-and-mouth disease	9,856
Destroyed:	
*Cattle	1,096
Sheep	170
Hogs	11

Total No. destroyed

1,277

*1,055 cattle destroyed were received in interstate shipments arriving in Montana November 5 and 6, 1914.

IMPORTATIONS.

STATES	Certifica- tions Received		Horses		Cattle		Swine	
	1913	1914	1913	1914	1913	1914	1913	1914
Arizona	2	1	.....	.....	2,055	1,185	.....	.....
Arkansas	5	2	35	13	3	.....	15	.....
California	5	9	17	27	2	10	.....	.....
Colorado	24	23	164	122	47	846	11	13
Dominion of Canada	119	54	386	185	60	143	.....	.....
France	.....	1	.....	3	.....	.....	.....	.....
Idaho	75	26	970	435	277	57	14	.....
Illinois	139	186	533	592	268	689	39	15
Indiana	15	29	21	67	24	82	2	.....
Iowa	375	366	1,573	1,331	1,022	2,204	148	353
Kansas	129	115	557	500	265	2,100	21	36
Kentucky	7	2	5	.....	21	45	.....	.....
Maine	.....	2	.....	.....	.....	21	.....	.....
Massachusetts	1	.....	.....	.....	1	.....	.....	.....
Michigan	14	11	26	17	9	28	.....	.....
Minnesota	486	677	1,450	1,790	10,172	7,861	104	62
Mississippi	1	.....	2	.....	.....	.....	.....	.....
Missouri	126	162	737	637	600	2,199	25	69
Nebraska	185	288	1,010	1,351	678	2,057	52	139
New Mexico	4	1	56	.....	1,004	952	.....	.....
New York	5	3	5	2	55	13	.....	.....
North Carolina	1	.....	2	.....	3	.....	.....	.....
North Dakota	673	655	4,129	4,513	3,097	2,298	272	160
Ohio	6	12	7	14	6	20	.....	5
Oklahoma	47	59	254	280	22	875	282	28
Oregon	37	45	559	718	47	2,648	126	17
Pennsylvania	1	2	3	1	.....	24	.....	.....
South Dakota	405	326	3,119	1,826	1,015	1,438	832	186
Tennessee	8	4	.....	5	274	83	.....	.....
Texas	13	31	114	40	7,255	15,666	.....	.....
Utah	12	3	89	17	2,250	4	.....	.....
Virginia	1	.....	4	.....	2	.....	.....	.....
Washington	149	161	1,533	1,258	140	289	29	133
West Virginia	3	.....	5	.....	6	.....	.....	.....
Wisconsin	240	219	771	523	1,266	1,498	43	.....
Wyoming	72	65	1,911	910	933	2,586	436	509
Totals.....	3,286	3,630	20,150	17,177	32,885	47,822	2,451	1,734

